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HARD CHOICES

A Report on the Increasing Gap Between America's Infrastructure Needs and Our Ability To Pay for Them

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Appendix 4. FLORIDA

A CASE STUDY

PREPARED FOR THE USE OF THE

SUBCOMMITTEE ON ECONOMIC GOALS AND INTERGOVERNMENTAL POLICY

OF THE

JOINT ECONOMIC COMMITTEE
CONGRESS OF THE UNITED STATES

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Preface

Infrastructure problems are widespread. They do not respect regional or state boundaries. To secure a better data base concerning national and state infrastructure conditions and to develop threshold estimates of national and state infrastructure conditions, the Joint Economic Committee of the Congress requested that the University of Colorado's Graduate School of Public Affairs direct a twenty-three state infrastructure study. Simultaneously, the JEC appointed a National Infrastructure Advisory Committee to monitor study progress, review study findings and help develop policy recommendations to the Congress.

In almost all cases, the studies were prepared by principal analysts from a university or college within the state, following a design developed by the University of Colorado. Close collaboration was required and was received from the Governor's staff and relevant state agencies.

Because of fiscal constraints each participating university or college agreed to forego normal overhead and each researcher agreed to contribute considerable time to the analysis. Both are to be commended for their commitment to a unique and important national effort for the Congress of the United States.

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FLORIDA'S INFRASTRUCTURE NEEDS & RESOURCES, 1982-2000: A PRELIMINARY ANALYSIS

by

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Neil G. Sipe
Earl M. Starnes

Executive Summary

The total capital needs for transportation, water and wastewater over the 1982-2000 period total $30.845 billion (see Table 1). Including the identified backlog requirements in this total results in a $41.012 billion need. This amount represents an annual expenditure of $1.714 billion for the 1982-2000 needs or $2.278 billion when backlog needs are included.

Revenue sources to meet these needs appear to be lacking. In total, only 59 to 66 percent of the needs can be met given current revenue estimates. Total unmet needs for the eighteen-year time period range from $10.577 to $12.545 billion, or $587.6 to $696.9 million annually. Furthermore, the capital needs examined here represent only three of a host of capital needs. Not included in this analysis are schools, prisons, public safety facilities, libraries, public buildings, drainage and solid waste disposal facilities. If these facilities were included, the levels of need would have been at least 50 percent higher.

How will the state be able to provide the needed infrastructure over the next eighteen years? To answer this question, the following factors should be considered:

1) The current administration in Tallahassee is making efforts to provide funds for these infrastructure needs. During this past legislative session alone, an additional penny

was added to the state sales tax; changes were made to increase revenues from the state gas tax; counties were given the authority to add up to four additional cents on the state gas tax; and an additional $100 million was provided to help local governments meet their wastewater facility needs. Had the legislature not taken these actions, the level of unmet needs would have been much larger.

2) Local governments have a substantial degree of unused fiscal capacity.

3) The availability of accurate data on revenue sources is spotty at best. This study was not able to identify firm sources of funding for many of the capital-need categories, particularly water and wastewater. We do know that water and wastewater projects are becoming increasingly dependent on impact fees, connection charges and user charges for capital-construction funding. However, a good estimate of the amount of these funds will not be known unless and until an in-depth local government analysis is undertaken.

4) The needs presented here provide estimates for one level of service. It is possible that the state will not be able to maintain the levels of service that everyone would desire.

The most important recommendation that can come from such a study is that this effort be continued. For a state that has more than $30 billion worth of infrastructure needs over the next eighteen years, little study has been done. The assessment of capital needs should be an ongoing effort at both the state and local level. The state should prepare a capital improvements plan which would be updated and examined annually. While local governments are required to provide a capital needs program in their comprehensive plans, their efforts to date have been woefully inadequate. The recent establishment of the Public Facilities Financing Commission should help in aiding both the state and local government in their capital planning efforts.

TABLE 1
SUMMARY TABLE: OVERALL NEEDS AND RESOURCES
(IN MILLIONS OF 1982 $)

	Backlog	1982-1985	1986-1990	1991-2000	Cumulative** 1982-2000
Transportation					
Needs	8067.4*	5860.5	7365.4	14778.3	28004.2
Resources	N/A	3458.1	4861.2	9107.6	17426.9
Shortfall	8067.4	2402.4	2504.2	5670.7	10577.3
Wastewater					
Needs	2100.0	313.7	396.1	878.0	1587.8
Resources	N/A	172.5-313.7	217.9-396.1	482.9-878.0	873.3-1587.8
Shortfall	2100.0	0-41.2	0-178.2	0-395.1	0-614.5
Water					
Needs	N/A	225.5	294.6	733.5	1253.6
Resources	N/A	0-225.5	0-294.6	0-733.5	0-1253.6
Shortfall	N/A	0-225.5	0-294.6	0-733.5	0-1253.6
Total					
Needs	10167.4	6399.7	8056.1	16389.8	30845.6
Resources	N/A	2769.1-2402.4	2977.0-2504.2	5670.7-6799.3	18300.2-20268.3
Shortfall	10167.4	3630.6-3997.3	5079.1-5551.9	9690.5-10719.1	10577.3-12545.4

N/A--not available
*Backlog needs are only for state/federal roads/bridges
**Does not include backlog
Source: See Tables 3.8, 3.10, 3.11, 4.2, 5.2.

A final recommendation based on the findings of this research would be a requirement that local governments report, on an annual basis, their capital expenditures. It is almost impossible to determine what local governments have spent for capital improvements without doing an individual case study for each local government. At the present time, the capital and operating expenditures are combined. The rate at which local governments are providing capital facilities is an important variable in determining their future needs.

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CHAPTER 1

INTRODUCTION

1.1 Objective of the Study

The objectives of this study are:

(1) to analyze the existing conditions of the state's capital structure;

(2) to identify the major capital needs for 1985, 1990 and 2000; and

(3) to identify and examine the ability of the state and local governments to pay for new infrastructure and adequately maintain existing capital structure. This study is sponsored by the U.S. Joint Economic Committee, and is one of twenty-one similar capital needs studies being undertaken in other states. Financial assistance was provided by the Office of the Governor of the State of Florida.

This effort is a first-cut attempt and should not be construed as being all-inclusive or complete, because we did not have the benefit of a great deal of time or money. Furthermore, previous research on infrastructure needs in Florida was practically non-existent. Hopefully, this effort will prompt continuing and in-depth research in this area.

1.2 Rationale for the Study

The need to evaluate basic infrastructure such as roads, ports, railroads, waste and water treatment facilities has become increasingly important in recent years. The Reagan administration has enacted tax and spending cuts to encourage private business investment. However,

there have been some unanticipated problems with this plan. Falling revenues, cuts in federal aid and difficulties in borrowing are making it extremely difficult for state and local governments to provide sound and basic infrastructure. Some economists and people in business feel that the condition of the nation's infrastructure is so poor, and that the current fiscal conditions of many local governments are so shaky, that a major crisis is imminent (Business Week, 26 October 1981).

The problems currently confronting state and local governments are a result of several factors. The first of these factors is a massive cut in federal aid. Local governments have become increasingly dependent on federal aid over the past four decades. Between 1948 and 1975, federal grants to state and local governments increased by 676 percent or $37 billion. Federal aid to state and local governments comprised only 11.3 percent of total revenues in 1948, but by 1975, this percentage had increased to 23 percent. Between 1975 and 1980, this percentage remained constant although federal aid increased in real terms. Since the end of 1980, however, federal aid in real terms has declined by $5.4 billion. In all probability, this trend will continue over the next several years and result in severe budget cuts at the state and local levels.

A second set of factors contributing to the current predicament is the tax/expenditure limitation movement. Data Resources, Inc., has identified fourteen states that have some form of tax, revenue or expenditure limitation. While the rationale for these limitations varies among the states, the end result is the same--a slowdown in the growth of state and local government revenues and a reduction in expenditures for maintaining and expanding local capital facilities.

A third factor causing problems for local governments is fluctuating interest rates. Between 1978 and 1981, the interest rate for a AAA-rated municipal bond more than doubled from 5.5 percent to 11.55 percent. Presently, the rate has fallen to 9.7 percent; however, interest rates are once again on the rise.

1.3 The Florida Context

Discussions of state and local government infrastructure problems are generally focused on the declining areas of the Northeast and Midwest; however, rapidly growing areas of the Sunbelt, including Florida, are faced with problems as well. Florida and its local governments are faced with two difficulties: 1) they have not kept pace with the maintenance of public facilities, particularly highways; and 2) due to rapid population increases over the past two decades, there is a large backlog of needed, new construction.

To put Florida's rapid population growth in perspective, the following points should be noted:

*Between 1970 and 1980, the state's population increased by more than 43 percent.

*Population is growing at an annual rate of 3.0 percent, with most growth attributable to inmigration from other states.

*By 1990, Florida will have more than twelve million residents, ranking it fourth among the states.

*This population increase has been and will continue to be concentrated along the coastal sections and in central Florida.

*It is projected that during the 1980s, Florida will grow at a rate twice that of other Sunbelt states and more than three times the rate of the United States.

While population growth in and of itself does not lead to infrastructure problems, there are some fundamental problems that should be noted. First, while the state has some innovative planning legislation, its implementation and enforcement has been lacking. Second, the current fiscal structure seems to be inadequate in capturing the funds necessary to enlarge and extend needed capital facilities.

The prospect for a resolution of the infrastructure problem in the near future is dim. In fact, there is a good possibility that the problems will become worse. Table 1.1 indicates the dependency of the state and local governments on federal revenues. In 1980, federal revenues comprised 23.8 percent of total state revenues and 10.2 percent of total local revenues. Both units of government have become increasingly dependent on these funds. Federal aid to the state has grown at an annual rate of 13.3 percent between 1960-1980, while federal aid to Florida's local governments has grown almost twice as fast at an annual rate of 23.2 percent.

One of the few positive aspects of the Florida situation is that the current fiscal capacity is quite good. Consider the following:

*Florida ranked forty-third among all states in fiscal year 1980-81 in the relationship of the state's taxes to personal income.

*Florida ranked thirty-fifth in terms of per capita tax revenues.

*Florida ranked fiftieth among the states in the increase of the state-local tax burdens between 1953 and 1975. (Government Finances, U.S. Department of Commerce.)

TABLE 1.1
FEDERAL AID TO FLORIDA

	State Government		Local Government	
Total	Million $	Percent of Total Revenue	Million $	Percent of Total Revenue
1960	159	21.4	16	1.7
1965	274	22.7	49	3.3
1970	493	21.4	84	3.1
1975	1030	23.4	461	8.2
1978	1414	22.5	967	12.2
1980	1917	23.8	1040	10.2
Annual growth rate 1960-1978		13.3%		23.2%

Source: U.S. Bureau of the Census.

The latest comprehensive work done on the state's fiscal capacity was in 1978 by the Florida Advisory Council on Intergovernmental Relations. They made the following conclusion:

> In the aggregate, local governments have substantial unused property tax capacity, but it is not evenly distributed among all local governments; with several exceptions, most of Florida's largest municipalities have a substantial degree of unused fiscal capacity.

Thus it appears that most local governments in Florida, unlike those in other states, have the fiscal capacity to construct and maintain some of the backlog of capital facilities. However, there are some caveats. The first is the voters' reluctance to approve any tax

increases. In fact, a proposed constitutional amendment is being placed on the Florida ballot in November, 1984. This amendment proposes a cap on the annual increases of local and state government revenues to two-thirds of the consumer price index, using fiscal year 1980-81 as the base year. The only allowance for population growth in this amendment is for property tax revenues, which in Florida make up only about 40 percent of local government revenue.

The second caveat is the relationship of the capacity to the need. One reason for the backlog of capital needs is that many local governments in the state felt that if they abstained from providing capital facilities, growth would be diverted elsewhere. As most local governments discovered, this policy was unrealistic and has failed. Hopefully, the research contained in this report will be helpful in assessing the gap between fiscal capacity/resources and infrastructure needs.

1.4 Capital Spending Trends

An examination of past capital spending trends is important when trying to estimate needs and resources for future capital spending. Tables 1.2 and 1.3 provide summaries of combined state and local government capital spending in Florida from 1975 through 1981. Table 1.2 indicates the expenditures in current-year dollars, while Table 1.3 provides the values in per capita 1972 dollars.

Table 1.2 illustrates that in 1981, combined capital spending by state and local governments amounted to nearly $3.128 billion, which compares with $1.904 billion in 1975. Upon examining these values in

real terms, it can be seen that total capital spending has declined from a high of $176.79 per capita in 1975 to $158.82 in 1981. Capital spending for highways, schools and other (a miscellaneous category that includes universities, public safety, utilities, drainage and public building) has also declined when compared with 1975. The highway category led the decline, falling from $54.93 per capita in 1975 to $41.68 in 1981. Only two categories, water and wastewater, have increased since 1975. Water spending has increased by almost three times from $5.71 in 1975 to $15.81 in 1981, while wastewater spending increased slightly from $12.49 in 1975 to $13.05 in 1981.

Two categories, highways and other, accounted for more than two-thirds of the capital expenditures in 1981. Water and wastewater, typically considered large expenditure items, accounted for only 18.2 percent of the total.

When comparing the capital expenditure trends with population, population was found to explain approximately 40 percent of the variation in total capital spending. Based on the data shown in Table 1.2, a 1-percent increase in population resulted in a .843-percent increase in combined state/local capital expenditures.*

*This was determined by comparing the log of population with the log of total capital spending.

TABLE 1.2
STATE AND LOCAL GOVERNMENT
CAPITAL EXPENDITURES FOR FLORIDA, 1975-1981
(IN MILLION OF DOLLARS)

	1975	1976	1977	1978	1979	1980	1981
Highways	591.7	500.9	455.5	518.5	648.7	832.0	820.9
Schools	286.5	249.7	280.0	271.4	294.7	325.9	302.5
Water	61.5	116.8	127.7	121.4	109.2	235.9	311.4
Wastewater	134.5	272.9	325.7	220.2	261.2	240.6	257.0
Other	830.0	739.5	829.5	763.1	892.6	1014.0	1336.0
Total	1904.2	1879.8	2018.4	1894.6	2206.4	2648.4	3127.8
Population (in millions)	8.62	8.74	8.92	9.16	9.45	9.75	10.11

Source: Governmental Finances, 1974/75-1980/81, U.S. Dept. of Commerce.

TABLE 1.3
PER CAPITA STATE AND LOCAL GOVERNMENT
CAPITAL EXPENDITURES FOR FLORIDA, 1975-1981
(1972 $)

	1975	1976	1977	1978	1979	1980	1981
Highways	54.93	42.35	35.14	36.63	41.61	47.62	41.68
Schools*	26.60	21.11	21.60	19.17	18.90	18.65	20.44
Water	5.71	9.88	9.85	8.58	7.00	13.50	15.81
Wastewater	12.49	23.07	25.13	15.56	16.75	13.77	13.05
Other**	77.06	62.54	64.01	53.92	57.27	58.03	67.84
Total	176.79	158.95	155.73	133.86	141.53	151.57	158.72

Source: Governmental Finances, 1974/75-1980/81, U.S. Dept. of Commerce.
*Includes primary and secondary schools only.
**Includes universities, public buildings, other utilities, drainage, public safety, etc.

1.5 Organization of the Report

This report is composed of six chapters. The first chapter is the introduction, which discusses the purpose of the study along with some background on the study area. The second chapter on the methodology provides the overriding assumptions upon which this study is based.

The third, fourth and fifth chapters discuss the current facilities, existing conditions, projected needs and sources of funding for transportation, wastewater and water, respectively. The last chapter contains a summary and provides some recommendations for more in-depth investigations.

CHAPTER 2

METHODOLOGY AND ASSUMPTIONS

2.1 Introduction

This chapter outlines the guiding principles and basic assumptions used in undertaking this analysis. General methodology will be discussed here; detailed methodology can be found in later chapters.

Before discussing the individual assumptions used in this analysis, the reader should be aware that this study involved secondary data collection. Time and funds were not available for a county-by-county and a city-by-city examination of infrastructure needs. Even if the time and money were available, many local governments have not given much thought to future needs because they are growing so fast that they do not have time to deal with the future. The goal of this study was to collect the information that was readily available, and when necessary, make some rough-cut projections of needs.

2.2 Basic Assumptions

2.21 Definition of Infrastructure

Broadly defined, infrastructure includes such items as transportation, water and wastewater systems, emergency services, recreational facilities, government buildings, schools, solid-waste systems and drainage. Past research in Florida has indicated that transportation, water and wastewater systems, and schools dominate the shopping list of capital needs. For this analysis, schools were

eliminated from the list to maintain comparability with the other state infrastructure studies. Thus, the discussion of infrastructure will be confined to roads, bridges, air and water ports, railroads, transit systems, water treatment and distribution systems, and wastewater collection and treatment systems.

2.22 Definition of "Future Needs"

Arriving at a clear definition for future needs was quite difficult, particularly in a growth state that has backlog needs as well as future needs. There is no doubt that if the state's population were frozen, many local governments would have a difficult time catching up with past needs. In fact, many of the local governments' capital improvement plans that we examined were geared solely for backlog needs. To deal with these problems while still maintaining comparability with other state infrastructure reports, the needs were divided into two categories: new or future, and backlog.

2.23 Population Projections

In making any future estimates of needed capital structure, the assumptions made about future population are crucial. In Florida, the Bureau of Economic and Business Research is charged with the task of making the official state population projections through 2020. Three sets of projections are published, giving three alternate scenarios (high, medium and low) regarding future population growth. These projections are shown in the Appendix. For this study, the medium projection was used because it is the most-likely estimate of future population. The projections are produced using a cohort-component

technique and refer to permanent resident population only; tourists and seasonal residents are not included. The medium state projections used for this study are 11,084,200 for 1985, 12,304,200 for 1990, and 14,592,600 for 2000.

2.24 Capital versus Operations/Maintenance

The distinction between these two items is usually clear-cut. Capital involves a one-time expenditure of funds to construct, remodel or reconstruct some new facility, whether it is a road, building, water treatment plant or fire station. Operations and maintenance, on the other hand, refer to day-to-day upkeep of capital facilities that involves repairing potholes in highways, painting buildings, or replacing broken water mains.

From the examples given above it is clear that there is a great deal of interdependence between capital and operations/maintenance. If potholes in the roads are not repaired, the road eventually will need to be reconstructed. The same holds true for bridges; without regular maintenance, they will need to be replaced.

For the purposes of this study, we tried to maintain the distinction between these two categories, although at times it was difficult. The greatest problem arose at the county/city transportation level because local governments in the state do not keep accurate records on capital expenditures. Thus in many cases, we were forced to use a category that contained both capital and operations/maintenance expenditures for roads.

2.25 Private versus Public Provision of Infrastructure

There is no definitive policy in Florida on who provides infrastructure. For this analysis, some assumptions were made. With respect to transportation, all subdivision and collector streets would be provided privately (subsequent maintenance is usually public), while all arterials would be the domain of state and local government. As for water and sewer services, the private sector would provide the neighborhood collection and distribution systems; the mains and larger collection lines, as well as the treatment facilities, would be provided by the public sector.

2.26 Estimates of Cost

The base year for the cost and revenue estimates contained in this report is 1982. Unless otherwise noted, all costs and revenues are shown in constant 1982 dollars.

The cost estimates for the various infrastructure categories include engineering and contingency costs. Not included in the estimates are the costs of debt. Generally if bonds are to be sold, an additional 30 percent should be added to the cost estimates.

CHAPTER 3

TRANSPORTATION

3.1 State/Federal Highways & Bridges

3.11 Existing Facilities

The state's highway system is composed of four types of roads: state highways, interstate highways, county roads and city streets. Together, this four-tier system totals 95,776 miles of highways, and state highways comprise 9,867 miles or about 10 percent of the total. While small in comparison to the total system, the state highways carry more than 50 percent of the annual vehicle miles traveled in the state.

The interstate highway system will total 1,460 miles when completed. Presently the system totals 1,258 miles, and the remaining mileage is estimated to be completed within the next ten years at a cost of $2.3 billion.

Because of Florida's coastal location and the nature of its terrain, there are more than 9,000 bridges, and 5,373 of these are state-maintained. Two of the state's more notable bridges should be mentioned. The Seven Mile Bridge in the Florida Keys has recently been reconstructed at a cost of $45 million, and is now the longest precast-segment bridge in the world. The other notable span is the Sunshine Skyway Bridge. After being severely damaged in 1980, its reconstruction is scheduled to be completed by 1985 at a cost of more than $215 million.

3.12 Current Conditions

The condition of the state's roads* was assessed in 1982 by the Florida Department of Transportation (FDOT), and its findings are summarized in Table 3.1. Highway conditions were based upon the structural and operational parameters. Roads were considered structurally deficient if they had a rating of less than 60 on a 0-to-99 scale.

TABLE 3.1
SUMMARY OF STATE ROAD CONDITIONS

	Lane Miles	Structural (condition) Deficiencies*		Operational (capacity) Deficiencies**	
		Lane Miles	Percent	Lane Miles	Percent
Urban Counties	22,773	4,680	20.5	6,119	26.9
Rural Counties	11,703	3,199	27.3	532	4.5
State Total	34,476	7,879	22.8	6,651	19.3

*Roads having a rating of 60 or below on a scale of 0-99.
**Roads operating at a level of service "D" (severe congestion) and below.

Source: Florida Department of Transportation, Roadway Deficiencies, 1982.

A road with a 60 rating would have extensive cracking and a rough-riding quality. Without prompt maintenance, these roads will require complete reconstruction. Operationally deficient roads were judged on physical characteristics such as lane width, number of lanes and the traffic volume carried. Roads are classified operationally deficient if they have a level of service "D" or below. Highways with a "D" service level exhibit severe congestion.

*The discussion of the state system also includes federal roads.

Using these guidelines, 22.8 percent of the state highways were deemed structurally deficient and 19.3 percent were found to be operationally deficient. In the urban counties (defined as Metropolitan Statistical Areas), 20.5 percent of the roads had structural problems while 26.9 percent were congested. In rural areas, more than 27.3 percent of the roads were structurally deficient while only 4.5 percent suffered from congestion.

Bridges in the state were categorized as either requiring replacement or needing repair. As Table 3.2 shows, 278 bridges (more than 5 percent of the total) require replacement. Additionally, 1,145 bridges require immediate repair, or they will need replacement also.

TABLE 3.2
SUMMARY OF STATE BRIDGE CONDITIONS

	Total Bridges	Bridges Requiring Replacement		Bridges Needing Repair	
		Number	Percent	Number	Percent
Urban Counties	3,684	141	3.8	835	22.7
Rural Counties	1,689	137	8.1	310	18.4
State Total	5,373	278	5.2	1,145	21.3

Source: Florida Department of Transportation, Bridge Deficiencies, 1982.

3.13 Projected Needs

The cost estimates for state and federal road and bridge needs were compiled by the Florida Department of Transportation (FDOT). Costs are broken down into five categories: resurfacing, new construction, bridge replacement, bridge rehabilitation and traffic operations. The assumptions made for each of these categories are discussed below.

3.131 Resurfacing and Rehabilitation

This category also includes some minor reconstruction and widening. The FDOT estimates that 1,200 lane miles annually require resurfacing or rehabilitation, an average that is based upon an analysis of deficiencies forecast to occur in the state and federal highway system. These deficiencies are in turn derived from the pavement condition survey and projected utilization of the roads. The FDOT estimates the backlog of roads requiring resurfacing at 7,200 lane miles.

Translating the lane miles into dollars is based on a unit cost of $38,000 per lane mile for state highways, and $53,000 per lane mile for federal highways. (Both costs are in 1982 constant dollars.) The disparity in the unit costs is due to the utilization of federal funds requiring different standards. As shown in Table 3.3, the backlog needs are $416.4 million; the 1982-1985 needs are $264 million; $358 million is required for 1986-1990; and $825 million is needed for 1991-2000. The eighteen-year total amounts to $1.447 billion, or $1.863 billion with the backlog.

TABLE 3.3
STATE/FEDERAL ROADS: RESURFACING SUMMARY
(IN MILLIONS OF 1982 $)

Function	Backlog	1982-1985	1986-1990	1991-2000
Resurfacing				
Needs	416.4	264.0	358.0	825.0
Resources	N/A	312.0	380.0	760.0
Unmet needs	416.4	-48.0	-22.0	65.0

N/A--not available
Source: Florida Department of Transportation, 1983 data.

3.132 New Construction

The FDOT has estimated a need for 300 lane miles of new highways to be constructed annually over the next eighteen years. This estimate is based on operational deficiencies and forecast highway usage. As a point of information, FDOT's estimate of backlog construction is 6,651 lane miles.

The unit cost for new highway construction (including right-of-way) is $897,000 per lane mile in rural areas and $1,753,000 per lane mile in urban areas. Table 3.4 indicates that the estimates of need for the backlog and the 1982-1985, 1986-1990, and 1991-2000 periods are $7.075 billion, $2.299 billion, $2.874 billion, and $5.748 billion, respectively. The total eighteen-year need is $10.921 billion, or $17.997 billion with the backlog.

TABLE 3.4
STATE/FEDERAL ROADS: NEW CONSTRUCTION SUMMARY
(IN MILLIONS OF 1982 $)

Function	Backlog	1982-1985	1986-1990	1991-2000
New Construction				
Needs	7075.4	2299.2	2874.0	5748.0
Resources	N/A	724.0	1295.0	2590.0
Unmet Needs	7075.4	1575.2	1579.0	3158.0

N/A--not available
Source: Florida Department of Transportation, 1983 data.

3.133 Bridge Replacement

Bridges requiring replacement over the next eighteen years will average 31 per year, as determined by the FDOT, and the average was based on structure surveys. The backlog of bridges to be replaced stands at 278.

Using values from the current bridge program, the estimated value of a new bridge was placed at $1.52 million. As indicated in Table 3.5, applying this value results in a $434.8 million expenditure for the backlog, $245.7 million for 1982-1985, $313.0 million for 1986-1990, and $625.0 million for 1991-2000. The total eighteen-year need is $1.184 billion, or $1.618 billion with the backlog.

TABLE 3.5
STATE/FEDERAL BRIDGES:
BRIDGE REPLACEMENT SUMMARY
(IN MILLIONS OF 1982 $)

Function	Backlog	1982-1985	1986-1990	1991-2000
Bridge Replacement				
Needs	434.8	245.7	313.0	625.0
Resources	N/A	208.6	310.0	620.0
Unmet Needs	434.8	37.1	3.0	5.0

N/A--not available
Source: Florida Department of Transportation, 1983 data.

3.134 Bridge Rehabilitation

An estimated 106 bridges annually will need structural rehabilitation over the next eighteen years. Again, this figure was determined from an examination of the bridge structure survey. The backlog of bridges requiring rehabilitation totals 1,145.

The average cost for rehabilitating a bridge is estimated to be $134,000 based on statewide average costs for the current year. Table 3.6 summarizes bridge rehabilitation needs that amount to $273.0 million over the 1982-2000 period, or $413.8 million with the backlog. Spending is programmed to be $56.8 million from 1982-1985, $71.9 million from 1986-1990, $144.3 million from 1991-2000, and $140.8 million for the backlog.

TABLE 3.6
STATE/FEDERAL BRIDGES:
BRIDGE REHABILITATION SUMMARY
(IN MILLIONS OF 1982 $)

Function	Backlog	1982-1985	1986-1990	1991-2000
Bridge Rehabilitation				
Needs	140.8	56.8	71.9	144.3
Resources	N/A	50.3	70.0	140.0
Unmet Needs	140.8	6.5	1.9	4.3

N/A--not available
Source: Florida Department of Transportation, 1983 data.

3.135 Traffic Operations

This category consists of the following components: intersection improvements; signalized intersections; new or extensions of turn lanes; highway lighting; signing and marking; and safety improvements. This program's main focus over the next two decades is to initiate an urban corridor program emphasizing computer-controlled signalization.

As illustrated in Table 3.7, the FDOT has estimated that such a program will cost $111 million from 1982-1985, $150 million from 1986-1990, and $300 million from 1991-2000. The total for the 1982-to-2000 period is $561 million.

TABLE 3.7
STATE/FEDERAL ROADS: TRAFFIC OPERATIONS SUMMARY
(IN MILLIONS OF 1982 $)

Function	Backlog	1982-1985	1986-1990	1991-2000
Traffic Operations				
Needs	N/A	111.0	150.0	300.0
Resources	N/A	84.2	141.3	282.6
Unmet Needs	N/A	26.8	8.7	17.4

N/A--not available
Source: Florida Department of Transportation, 1983 data.

3.136 Needs Summary

Table 3.8 lists the state and federal road and bridge needs as the following: $8.067 billion for the backlog; $2.977 billion for 1982-1985; $3.767 billion for 1986-1990; and $7.642 billion for 1991-2000. The total need is $14.386 billion, or $22.453 billion with backlog needs included.

3.14 Sources of Funding

The revenues and expenditures shown in Table 3.9 provide a summary of how the state's transportation system is funded. The top half of the table lists the various revenue sources. More than 35 percent of the revenues come from state sources, which are dominated by the motor fuel tax. The federal government provides almost 30 percent of the revenues, slightly more than 22 percent comes from cities and counties, and the balance of 12 percent comes from bond issues.

As for the expenditures, 32 percent of the funds go to the interstate and federal aid highway system; almost 30 percent are spent on city and county road programs; about 10 percent go to building and maintaining the state's primary highway system; and the balance is spent on categories such as transit, aviation and bond programs.

Even though the data shown in Table 3.9 are from 1979, they provide a good basis for understanding where the revenues originate and where revenues are spent. The federal government increased fuel taxes five cents per gallon in January, 1983. The only other major change in transportation funding since 1979 occurred in March, 1983, when a special session of the Florida Legislature was called for the single purpose of increasing funding for transportation. Numerous

changes were made to the motor fuel tax and other transportation-related revenues that will result in an increase in expenditures of almost $250 million per year.

When projecting future road revenues, the FDOT does not go beyond a five-year time horizon, in this case to 1986. Therefore, the sources of revenue for 1987-2000 were based on the funding levels for the 1980-1986 period. This assumption applies to funding levels shown in Tables 3.3 through 3.8.

TABLE 3.8
STATE/FEDERAL ROADS & BRIDGES: OVERALL SUMMARY
(IN MILLIONS OF 1982 $)

Function	Backlog	1982-1985	1986-1990	1991-2000
All Functions				
Needs	8067.4	2976.7	3766.9	7642.3
Resources	N/A	1294.9	2055.0	4110.0
Unmet Needs	8067.4	1681.8	1711.9	3532.3

N/A--not available
Source: Florida Department of Transportation, 1983 data.

TABLE 3.9
REVENUES AND EXPENDITURES:
FLORIDA'S TRANSPORTATION SYSTEM
(1979)

	Millions of Dollars	Percent
Revenues		
Federal Aid	464	29.9
State Taxes		
Motor Fuel	400	25.8
License Tags	74	4.8
General Revenue	54	3.5
Miscellaneous Revenue	25	1.6
Bond Issues	190	12.2
County General Revenue	185	11.9
City General Revenue	160	10.3
Total	1552	100.0
Expenditures		
Interstate System	248	16.0
Federal-Aid Highways	249	16.0
State Primary	97	6.2
Maintenance of State System	67	4.3
Support (Adm./Planning)	47	3.0
Public Transit	106	6.8
Aviation	34	2.2
Railroads	1	0.1
Bond Programs	250	16.1
County Programs	258	16.7
City Programs	195	12.6
Total	1552	100.0

Source: Report of the Florida Transportation Policy Study Commission, 1980.

3.141 Resurfacing and Rehabilitation

Table 3.3 provides a summary of the projected funding for resurfacing and the resulting shortfalls. The expected funding amounts to $312 million for 1982-1985, $380 million for 1986-1990, and $760 million for 1991-2000. These funding levels will produce surpluses of $48 million for 1982-1985 and $22 million for 1986-1990, and a shortfall of $40 million for 1991-2000. If surpluses actually occur they will be used

to reduce the $416.4 million backlog. One reason for the small levels of unmet needs is that due to the critical nature of this program (which prevents roads from requiring reconstruction), federal-aid construction funds were diverted by the state for these efforts.

3.142 New Construction

Expected new construction funding is shown in Table 3.4. As with many of the other transportation programs, the funding is meager relative to the need. Funding for new roads amounts to $4.609 billion over the 1982-2000 period; however, the anticipated need is more than two-and-one-half times as much or four times as much when the backlog is included. One problem facing the new construction program is that funding is being diverted from new construction to repair and rehabilitation programs. One of the first signs of fiscal stress is the diversion of new construction funds to operations and maintenance categories.

3.143 Bridge Replacement

A summary of the bridge replacement funding and the resulting unmet needs is shown in Table 3.5, which indicates that the levels of funding (excluding the backlog) almost match the needs. Unmet needs amount to $37.1 million during 1982-1985, $3.0 million during 1986-1990, and $5.0 million for the 1991-2000 period. If the projected level of funding is maintained, the number of bridges requiring replacement will increase only slightly over the 1982-2000 period.

3.144 Bridge Rehabilitation

The projected bridge rehabilitation funding is provided in Table 3.6. As was the case with the bridge replacement program, the funding very closely matches the need with unmet needs of $6.5 million, $1.9 million, and $4.3 million for the three planning horizons.

3.145 Traffic Operations

A summary of the funding for the traffic operations program is shown in Table 3.7. This program, like the bridge programs, is well funded, providing for about 90 percent of needs. These funding levels should provide some improvement to the operating efficiency of the statewide system.

3.146 Summary

Table 3.8 provides an overall funding summary of the state/federal road and bridge system, and indicates a projected funding of $7.460 billion for all programs for the eighteen-year period. This amount includes new revenues resulting from the 1983 special legislative session noted earlier. The total needs amount to $14.386 billion, or $22.453 billion with the backlog, which results in a total shortfall of $6.926 billion, or $14.993 billion with the backlog. In annual terms, the transportation shortfall is $384.8 million, or $832.9 million with the backlog. Without special action by the Legislature to increase gasoline taxes this year, the shortfall would have been much larger. The only negative note is that a proposed constitutional amendment on the November, 1984, ballot would nullify the gas-tax increase.

3.2 Local Roads & Bridges

3.21 Existing Facilities

Florida's local road system is composed of the county road network and city streets. The most extensive system in the state is the county road network under the jurisdiction of each of the sixty-seven counties. These roads amount to 59,193 miles, of which 32,577 are paved and 26,644 are unpaved. Florida cities have jurisdiction over 25,121 miles of streets, of which 20,675 are paved and only 4,451 are unpaved. Additionally, 3,913 bridges of more than twenty feet in length are also part of the local road system.

In 1977, a law was passed by the Legislature that resulted in a transfer of many formerly state-maintained roads to county responsibility. This transfer was completed in 1980. Even though maintenance funds were provided by the state, the counties were burdened with additional responsibility.

3.22 Current Conditions

There has been no comprehensive survey of county and city road and bridge conditions, and such a survey of sixty-seven counties and more than 250 cities was beyond the scope of this study. While a detailed summary of local conditions is unavailable, some conclusions can be abstracted from a selected sample in the state. In the urban and rapidly growing areas of the state, local road needs are the primary concern. In the Charlotte Harbor region (Sarasota, Charlotte and Lee counties), road needs amounted to more than 30 percent of the total capital needs over the next five years.

If and when local road conditions are tabulated, the findings will undoubtedly be staggering. Conservatively assuming that local roads are in the same condition as the state network, more than 27,000 miles would be structurally deficient and 16,000 miles would be operationally deficient. As for the bridges, 207 would need replacement and 988 would need repair.

3.23 Projected Needs

As noted in the previous section, there has been no comprehensive analysis of local road conditions or future needs. The data presented here were based on a survey done jointly by the Florida League of Cities and the Florida Counties Association. The survey forms were mailed in January and February of 1983 to all cities and counties in the state. The following ground rules were established:

*This is not a wish list.

*The totals do not include public transit needs.

*Dollar needs are based only on maintenance of the existing road network.

*The figures do not reflect system expansion.

An examination of the survey results has shown that the quality of the data is highly variable. In some cases the ground rules were followed, and in other cases they were not. Nevertheless, these are the only numbers that exist for local governments.

Estimated road needs for the cities and the counties in the state are provided in Table 3.10. The cumulative county needs are more than twice the city needs and amount to $8.458 billion between 1982-2000, compared to $3.714 billion for the cities. The total of the

two categories amounts to $12.173 billion, which is more than $600 million above the state/federal road and bridge needs.

TABLE 3.10
LOCAL ROADS AND BRIDGES: NEEDS AND RESOURCES
(IN MILLIONS OF 1982 $)

	Backlog	1982-1985	1986-1990	1991-2000
County Roads				
Needs	N/A	1780.8	2226.0	4452.0
Resources	N/A	1228.7	1535.9	3071.9
Unmet Needs		552.1	690.1	1380.1
City Streets				
Needs	N/A	782.0	977.5	1955.0
Resources	N/A	588.1	735.1	1470.2
Unmet Needs		193.9	242.4	484.8
Total				
Needs	N/A	2562.8	3203.5	6407.0
Resources*	N/A	2021.8	2578.5	4542.1
Unmet Needs		541.0	625.5	1864.9

NA Not available
*Includes local-option gas tax, which averages $102.5 million annually for 1984-1988 period.
Source: Florida League of Cities/Florida Counties Association Survey, 1983.

3.24 Sources of Funding

The projected resources and the resulting unmet needs for cities and counties in the state are shown in Table 3.10. When compared to the state, the local governments appear to be well-funded. Whereas the state's resources are less than one-third of its needs over the eighteen-year planning horizon, local resources are slightly more than 70 percent of their projected needs. There are two possible reasons for this discrepancy: either local programs are better funded or the

data are suspect. In all probability, it is combination of the two reasons.

In an effort to aid local governments in dealing with road and bridge problems, the state Legislature has given counties the option of assessing a local gas tax (up to four cents per gallon). This tax can be approved by a vote of each county commission, and does not require voter approval. This local-option tax became effective on September 1, 1983, and in most cases will be valid for a five-year period. As of August, 1983, thirty-six of the state's sixty-seven counties had not approved a local-option gas tax; one county had approved a one-cent tax; thirteen counties had approved a two-cent tax; one county had approved a three-cent tax; and sixteen counties approved a four-cent tax.

Estimates of the additional revenue generated annually from this local-option tax range from $69.46 million to $135.5 million. Based on the data in Table 3.9, local governments have unmet needs that average $186.5 million over the next eighteen years. Revenues generated from the local gas tax will average $102.5 million annually. Over the next five years, the unmet local road needs will decline to $84.0 million annually. While this tax is valid for a limited period of time, it will go a long way toward helping local governments deal with their road needs.

3.3 Public Transportation

3.31 Existing Facilities

This miscellaneous transportation category includes railways, airports, seaports and local transit systems. Florida's rail system

comprises 3,700 miles of track that are owned by twelve railroad companies. More than 95 percent of rail traffic is for movement of freight, with only two Amtrak lines providing passenger service. Railroads transport nearly 55 percent of all commodities originating in the state and carry more than one million passengers.

In 1981, Florida had 484 licensed landing facilities, including one blimp base, numerous seaplane bases and a large number of heliports/helipads. Of the total, 134 were public facilities and 26 had Federal Aviation Administration control towers. These facilities accounted for more than ten million takeoffs and landings in 1980. Miami's airport served more than twenty million passengers in 1980, making it the leader in the state, followed by Tampa with slightly more than eight million. The four airports in Miami, Tampa, Ft. Lauderdale and Orlando dominate air carrier enplanements, accounting for 80 percent of all Florida boardings.

The state has ten major ports and seventeen minor ports. Seven of the ten major ports function as port authorities, while the remaining three are operated by local governments. Maintenance of channels and turning basins is the responsibility of the U.S. Army Corps of Engineers. Traditionally, the objective of the state's ports has been to meet regional needs. Miami has developed into a major passenger cruise port; Tampa is the principal phosphate port, leading all Florida ports in cargo volume; and Jacksonville, a major container and automobile port, leads the state in cargo value.

All but one of the state's twenty-four urban transit systems are operated by public agencies. All present transit systems use buses, about 1,500 in total. These systems accommodate 4 percent of the

peak-hour work trips in major urban areas, and provide access to 60 percent of the state's population.

3.32 Current Conditions

Competition from alternative modes of transportation, along with strict regulation and some change in ownership, has created industrywide financial problems for the railroads. These deterrents to profit will more than likely result in further cuts in an already spotty rail network. The only bright news for the rail industry is the possibility of a rapid rail system connecting the Miami, Orlando and Tampa urban areas. This system is similar to the Japanese bullet train, and there is a possibility of Japanese financing for the project.

With respect to the major air-carrier facilities, the condition of the state's airports is quite good. New facilities have recently been completed in Orlando and Ft. Myers, and the facilities at Tampa and Miami are undergoing expansion and improvement. According to the state Transportation Plan, the facilities at Sarasota, West Palm Beach and Ft. Lauderdale need replacement. However the report did note that with expansion, most facilities are adequate to serve the state over the next eighteen years.

The seaport facilities appear to be in good shape, with the existing ports serving the state adequately.

The existing bus systems in Florida are substantially subsidized from sources other than collected fares. The best system in the state collects only 54 percent of its operating costs from the fare box, with the worst deriving only 12 percent. Recent federal decisions to cut operating assistance for local transit systems will have serious impacts on the bus systems.

As for rapid transit systems, Miami and Dade County are currently constructing a fixed-rail system composed of twenty stations and covering 20.5 miles. The system will interconnect in the downtown area with a "people mover" system consisting of automatically controlled driverless vehicles. Opening of the Miami system is scheduled for December, 1983.

3.33 Projected Needs

The needs for the public transportation programs were provided primarily by the FDOT, whose status-quo needs estimate was designed to lessen the impact of federal fund reductions and provide expanded support of aviation, rail and "people mover" programs.

The projected needs for these various programs are outlined in Table 3.11. The needs of the transit program far outweigh the needs of the other programs. Transit needs comprised $818 million of the $1.445 billion total need for the public transportation category. Not included in the transit needs are numerous proposals in Jacksonville, Tampa, Orlando and Ft. Lauderdale. Jacksonville is considering a system similar to Miami's, with a fixed-rail system (28.0 miles and thirty-two stations) interconnecting with a 4.6-mile downtown people-mover system. Downtown people-mover systems are also on the drawing boards in Tampa, Orlando and Ft. Lauderdale. It is safe to say that without considerable federal aid, these systems will not be built.

Needs for passenger rail and aviation were almost equal at $269 million and $262 million, respectively. As previously noted, most of the aviation needs are for expansion of air-carrier facilities and improvement of general aviation fields. The seaport data were obtained

from a survey of the port authorities, and resulted in a needs estimate of $96 million for the 1982-2000 period.

3.34 Sources of Funding

The sources of funding for the public transportation program, which includes transit systems, air and water ports, and railroads, were estimated substantially by the FDOT. Unfortunately, the funding was not broken down by subcategory.

Table 3.11 provides a summary of the anticipated resources for the public transportation component. The anticipated funding levels are small relative to the needs. The total unmet needs for the 1982-2000 period total $617.7 million, compared to a needs total of $1.445 billion. The hardest-hit area will be the transit program, where the federal government is phasing out a great deal of its assistance to local governments. It is questionable whether or not the state will be able to make up the difference. A positive note is the increased funding for all transportation programs resulting from the 1983 special session of the state Legislature; however, the allocation of these revenues to specific programs has not yet been determined. The revenues shown in Table 3.11 have been increased on the assumption that public transportation will receive 9.1 percent of the new revenues. This assumption is based on the 1979 share of transportation revenues received by transit, rail and aviation, as indicated in Table 3.9.

TABLE 3.11
PUBLIC TRANSPORTATION:
NEEDS AND RESOURCES
(IN MILLIONS OF 1982 $)

	1982-1985	1986-1990	1991-2000
Needs	321	395	729
Transit	172	216	430
Rail	56	72	141
Aviation	31	79	152
Seaports	62	28	6
Resources	141.4	227.7	455.5
Unmet Needs	179.6	167.3	273.5

Source: New Directions for Transportation in the 1980's, Florida Department of Transportation, 1981.

CHAPTER 4

WASTEWATER

4.1 Existing Wastewater System

Currently, there are approximately 3,700 permitted domestic wastewater treatment facilities in Florida. More than 60 percent of these facilities are quite small (2,000 to 24,999 gallons per day); however, the greatest percentage of treatment is provided by the largest plants (those greater than 1,000,000 gallons per day). There are only 186 of these plants, but they provide treatment for more than 82 percent of the wastewater in the state. While the treatment processes vary considerably among the facilities, the primary goal is to remove the biological oxygen demand and the suspended solids. The most-common secondary treatment method is extended aeration, which is used in more than 66 percent of the facilities. Other methods used to a lesser degree include contact stabilization, activated sludge, trickling filter and AWT.

Once the effluent is treated it must be disposed of properly. Again, there are a variety of methods used, with almost half of the facilities utilizing percolation/evaporation ponds. Other common methods include discharge into surface water, drainfields and spray irrigation.

Not all domestic sewage in the state is treated at permitted treatment facilities. A few of the large treatment facilities are unable to meet the current wastewater standards, and are operating either illegally or on temporary operating permits. Furthermore, many of the facilities operating on temporary permits have been doing so for years because the funds are unavailable to correct the problems.

Another serious problem to note is the presence of septic tanks, because there is concern that older septic tanks may not be functioning properly. Additionally, many septic tanks are located in regions with high water tables in wet seasons, which creates the possibility of contamination of ground waters. There is a backlog need for treatment plants to replace septic systems in such areas as Sarasota and Miami.

There is no accurate count on the number or location of septic tanks statewide or the volume of wastewater going into septic tanks. An estimate of the amount of wastewater flowing into septic tanks can be deduced from analyzing the amount treated by treatment plants. Assuming that the amount of wastewater generated by each person is 100 gallons per day, the total amount generated in the state in 1981 would have been 1,010 million gallons per day (mgd). However, statistics on the amount of wastewater treated by the treatment plants indicate that about 850 mgd are processed. Consequently, only 84 percent of the wastewater receives sewage treatment. While septic tanks may be adequate for disposing of wastewater in rural areas, they are inappropriate for urbanizing areas where many of them are located. Many parts of the state that only ten years ago were rural in nature are now rapidly urbanizing. These counties have a substantial number of people on septic tanks, and are lacking the financial resources to provide better facilities.

4.2 Projected Needs

4.21 Methodology

The methodology for estimating the state's wastewater treatment and collection needs utilized a per capita sewage-generation rate of 100

gallons per day. This methodology was applied to the medium population projections for the state for 1985, 1990 and 2000, which are provided in the Appendix. Furthermore, it was assumed that only 84 percent of the new population would be connected to a central treatment facility. This assumption was based upon current estimates of wastewater that receives treatment. These estimates do not take into account the backlog of wastewater treatment (septic tanks, inadequate treatment plants) needs, which are estimated by the Environmental Protection Agency (EPA) to be approximately $2.1 billion (1980 dollars).

The results of these calculations are shown in the top portion of Table 4.1. It is estimated that between 1982 and 1985, an additional

TABLE 4.1
WASTEWATER SYSTEM NEEDS

	1982-1985	1986-1990	1991-2000
Additional capacity required (mgd)*	82.2	102.5	192.2
Projected costs (in millions of 1982 $)			
Treatment	152.4	178.4	278.3
Collection	161.3	217.7	599.7
Total	313.7	396.1	878.0

*This requirement assumes that 84 percent of the new population will be connected to a wastewater treatment facility, and that the sewage generation rate will be 100 gallons/capita/day.
Sources: Estimating Water Treatment Costs, U.S.E.P.A., 1979; Economic Impact Assessment Statement, Fla. Dept. Env. Reg., 1981.

82.2 mgd of wastewater treatment capacity will have to be added; and for the five years between 1986 and 1990, another 102.5 mgd will need to be added. For the 1991-2000 period, the additional capacity amounts

to 192.2 mgd. Over the eighteen-year period, an additional 376.9 mgd will be required.

Translating these capacity needs into dollars and cents is no easy task. Two methods could be used in this effort: a survey of all the cities and counties in the state; or an engineering standards approach. Due to time considerations, the engineering standards approach was used here. Utilizing the following EPA cost formula:

$$Cc = 2.39\ (Dc)^{.71}$$

where:

Cc = total capital cost in millions of 1982$; and

Dc = design capacity in mgd,

wastewater treatment costs were estimated for each county in the state. It was assumed that all new capacity would be provided for in one wastewater treatment plant for each of the three time periods. In other words, one treatment plant would be constructed in the 1982-1985 period, one in the 1986-1990 period and one between 1991-2000. This approach results in a conservative estimate of the dollar cost because more than three treatment facilities will be constructed in many of the larger counties.

The methodology for estimating the collection network employed engineering standards as well. Cost estimates assumed that all subdivision and neighborhood collection lines would be provided privately. Based on EPA standards, it was assumed that each new person would require one foot of interceptor sewers. The following equation was used to estimate the average pipe diameter:

$$Pd = 17.08(f)^{.45}$$

where:

Pd = the pipe diameter in inches; and

f = the average flow in mgd.

Once the length and diameter of the sewer were estimated, then an EPA table was used to estimate the total in-place costs (including all appurtenance and nonconstruction costs). This table is provided in the Appendix.

4.22 Cost Estimates

The lower half of Table 4.1 provides the cost estimates for wastewater, which are separated into treatment and collection costs for three time periods: 1982-1985, 1986-1990, and 1991-2000. The treatment costs range from $152.4 million in 1985 to $178.4 million in 1990, and to $278.3 million in 2000. The collection system costs are higher than the treatment costs in all cases and range from $161.3 million in 1985, to $217.7 million in 1985, and to $599.7 million in 2000. Total wastewater needs amount to $313.7 million in 1985, $396.1 million in 1990, and $878.0 million in 2000. The cumulative cost for the eighteen-year period from 1982-2000 is $1.587 billion. Remember that all cost estimates are provided in constant 1982 dollars.

As a check of the engineering standards approach, the results of the EPA survey (Cost Estimates for Construction of Public-owned Wastewater Treatment Facilities, U.S.E.P.A., 1981) were obtained for comparison. EPA's 1980 survey estimated total wastewater needs for the 1980-2000 period to be $2.836 billion in constant 1980 dollars. Given the difficult nature of estimating these numbers, this disparity is not that great. Furthermore, estimates of wastewater costs were expected

to be on the low side due to some of the assumptions made about the number of new treatment facilities per county. Thus, any value in the range from $1.587 billion to $2.836 billion represents a reasonable estimate of the state's wastewater needs.

4.3 Sources of Funding

Over the past decade, the federal government has provided more than $1.2 billion to local governments in the state for construction of sewage treatment facilities. In 1979 and 1980 alone, the state received $130 million annually, which provided about 75 percent of the funding for wastewater treatment.

If these trends were to continue, the state would be in good shape. However, the Reagan administration and Congress are proposing to make some substantial cuts in the program. According to the Florida Department of Environmental Regulation (Economic Impact Assessment Statement for the Proposed Revisions of Chapter 17-6, F.A.C., Fla. Dept. Env. Reg., 1981), the most optimistic of the several alternatives facing Florida would be a cut to a level of $90 million. Under other scenarios, the state could receive only $36 million.

Federal participation in local projects has dropped from a 75-percent share to 55 percent. While this scenario has caused some problems, Congress is also proposing that funds could only be used to serve 1980 populations. This proposal is potentially the most damaging for Florida.

Since there are no firm answers on the future of federal funding for wastewater facilities, a 55-percent federal contribution was assumed. This share was applied to both the treatment facilities and the collection

network. Table 4.2 provides estimates of future federal funding for wastewater treatment. Revenues of $172.5 million are estimated for 1982-1985, $217.9 million for 1986-1990, and $482.9 million for 1991-2000.

Federal revenues are provided on a matching basis, therefore the local government contribution must make up the remaining balance of the need if the facilities are to be built. In all likelihood, local governments will have to rely upon connection charges and impact fees to raise the necessary revenues. Estimates of the required impact fee and/or connection charge on a per household (2.5 people) basis amounts to $125 for the 1982-1985 period, $435 for 1986-1990, and $514 for 1991 to 2000. These fees represent a one-time charge and are shown in 1982 dollars. Thus depending on the amount of the fee, local revenues could range from $0-41.2 million for 1982-1985, $0-178.2 million for the 1986-1990 period, and $0-395.1 million for 1991-2000.

To aid local governments that decide to sell bonds to pay for wastewater treatment facilities, the state has established a program in the Division of Bond Finance that allows local governments to sell their bonds under state authority, which results in lower issuing costs and lower interest rates.

One additional note on revenues involves recent legislation by the state to provide $100 million over the next several years for local wastewater treatment projects. Approximately half of this money will be spent in cities with a population of thirty-five thousand and less. This contribution from the state will be tied to the federal grant system, and will increase the revenues available for wastewater systems to $272.5 million for the 1982-1985 period.

Looking again at Table 4.2, the projected shortfall in required wastewater facility funding is shown. The unmet needs range from $0-41.2 million for 1982-1985, $0-178.2 million for 1986-1990, and $0-395.1 for 1991-2000. The state contribution in the 1982-1985 period allows the local effort on a per household basis to fall from $430 to $125.

It is clear that the future unmet needs can be met from a local effort that is quite reasonable when presented on a per house basis. These future needs could even be lower if local governments encourage development in areas that have existing wastewater capacity.

TABLE 4.2
WASTEWATER SYSTEM: SUMMARY OF NEEDS AND RESOURCES
(IN MILLIONS OF 1982 $)

	Backlog	1982-1985	1986-1990	1991-2000
Costs	2100	313.7	396.1	878.0
Revenues				
Federal*	N/A	172.5-272.5**	217.9	482.9
Local***	N/A	0-41.2	0-178.2	0-395.1
Shortfall	N/A	0-41.2	0-178.2	0-395.1

N/A--not available
*Federal revenues are based on a 55-percent contribution for treatment plants and collection/pumping systems.
**This figure includes $100 million from the state on a one-time basis to help smaller cities solve wastewater treatment needs.
***Local revenues assume a one-time household connection charge of $125 for 1982-1985, $435 for 1986-1990, and $514 for 1991-2000.
Source: Estimating Water Treatment Costs, U.S.E.P.A., 1979.
Economic Impact Assessment Statement, Fla. Dept. Env. Reg., 1981.

The backlog needs situation is somewhat more serious and requires more study. Little thought has been given on how funds for this backlog will be derived. Currently, all we know is that there is $2.100 billion of backlog wastewater treatment needs. It is known that some of this backlog will be removed when new and larger plants are

built to serve new population, but how much will be removed is not known at this time. All that can be concluded is that the total needs (backlog plus future) are less than $3.687 billion (the sum of the $2.100 billion backlog needs and the new needs for 1982-2000 of $1.587 billion).

CHAPTER 5

WATER

5.1 Existing Water System

The largest consumptive use of freshwater in the state is for irrigation, which consumes 1512 mgd or 61.9 percent of the total. Public withdrawals amount to only 329 mgd or 13.5 percent of the state total. The remaining water use is accounted for in rural, thermoelectric and industrial applications. Eighty-seven percent of the water used for public supplies comes from groundwater sources, while 13 percent is taken from surface waters.

Based on the 1980 Census, slightly more than 88 percent of the year-round households in the state were supplied with water from a public system or private company. Twelve percent received water from individually drilled or dug wells.

Experts agree that Florida has an adequate water supply to serve the existing population. However, the population concentrations and the water supplies do not coincide. Water supplies in the coastal areas are limited by dependence on shallow aquifers and the need to restrict water withdrawals to control saltwater intrusion. The Floridan aquifer underlies the state, and is estimated to contain more water than all of the Great Lakes. This aquifer is potable, but is located away from the major population centers.

Water quantity is but one concern; the other is water quality. There are numerous water quality problems in the state ranging from agricultural and urban runoff, and septic tank pollution, to mining and landfills. Groundwater supplies are easily contaminated and over the

past several years, there have been numerous instances of groundwater contamination from landfills, dump sites, pesticides/herbicides and leaking underground storage tanks. The state has undertaken steps to remedy these problems by proposing strict groundwater regulations. These regulations will aid in preventing future problems; however, many problems from existing dumpsites will remain. To clean up these existing sites will require large sums of money that do not presently exist.

5.2 Projected Needs

5.21 Methodology

The methodology for estimating the state's drinking water or household water needs was based on a rate of 125 gallons per person per day. As with the wastewater projections, this figure was applied to the medium population projections for the state made by the Bureau of Economic and Business Research. These water-use estimates do not take any backlog needs into account. It is also assumed that 88 percent of the state's new residents will be connected to a central water system. This assumption was based on the present (1981) percentage of homes on central water systems. Furthermore, it is important to realize that the cost estimates provided here do not include wellfield development costs, transmission from the source to the treatment facility, or debt service costs.

Given these assumptions, the estimated needs for the state are provided in the top half of Table 5.1. The needs for the planning horizons are 107.6 mgd for 1982-1985, 134.3 mgd for 1986-1990, and

251.7 mgd for 1991-2000. The total needed over the 1982-2000 period amounts to 493.6 mgd.

The engineering standards approach was the only method available to translate these water-use projections into dollar costs. While there are five water management districts in the state, they are not concerned with the treatment and delivery of water to the end user. There is no state agency responsible for water per se, with the water quantity area handled by one state agency and water quality handled by another. Therefore, no statewide cost estimates have been made and the availability of such data at the local level is spotty at best. Unfortunately, the federal government has not done much in this area either, except for the wastewater treatment survey discussed in Chapter 4.

TABLE 5.1
WATER SYSTEM NEEDS

	1982-1985	1986-1990	1991-2000
Additional capacity required (mgd)*	107.6	134.3	251.7
Projected costs (in millions of 1982 $)			
Treatment	56.5	66.5	105.3
Transmission	169.0	228.1	628.2
Total	225.5	294.6	733.5

*This assumes that 88 percent of new population will be connected to a central water system and that there is an average use of 125 gallons/capita/day.
Source: Derived from Estimating Water Treatment Costs, U.S.E.P.A., 1979.

The equation shown below was used to estimate water treatment plant costs.

$$Cc = .716(Dc)^{.7334}$$

where:

Cc = total capital costs in millions of 1982$; and

Dc = design capacity in mgd.

While there are a number of water treatment methods, this equation is calibrated for a conventional treatment plant consisting of a chemical feed system, rapid mix, flocculation, clarification, filtration and sludge disposal facilities. Also included in the plant cost are land, engineering and legal costs. Much of the basic data came from Estimating Water Treatment Costs, published in 1979 by the EPA.

The methodology for estimating the distribution system employed engineering standards as well. Unfortunately, specific standards for water transmission lines were not available. Thus, the interceptor sewer costs were used as a substitute, and using these costs as a proxy will tend to underestimate the true water transmission costs. Generally, water transmission systems are required to be of a higher quality due to the higher pressures that must be maintained. The equation and assumptions for wastewater collection costs described in Chapter 4 apply here as well.

5.22 Cost Estimates

The lower portion of Table 5.1 shows the costs estimates for future water needs. The water treatment costs amount to $56.5 million for 1982-1985, $66.5 million for 1986-1990, and $105.3 for 1991-2000. A total of $228.3 million is required for the 1982-2000 period. Transmission costs amount to $169.0 million for 1982-1985, $228.1 million for 1986-1990, and $628.2 million for 1991-2000, for an eighteen-year total (1982-2000) of $1.025 billion. Again, as with the wastewater

system, the transmission costs are greater than the costs for treatment facilities.

The total costs for the water system are the smallest of the infrastructure costs discussed here, amounting to $225.5 million for 1982-1985, $294.6 million for 1986-1990, and $733.5 for 1991-2000. The estimated eighteen-year cost will total $1.253 billion. To put this amount in perspective, the roads needs for a four-year period are more than three times the eighteen-year needs for water.

5.3 Sources of Funding

While the total needs of the water system are less than those of the wastewater system, the federal government does not provide funds to aid local governments in constructing water systems. The burden of paying for water treatment and distribution systems falls entirely upon local government.

As with wastewater treatment facilities, local governments have begun to seek new sources of revenue to pay for water treatment facilities. While hook-up charges for water and sewer services are quite common, local governments are now beginning to charge an additional fee (an impact fee) that aids in the expansion and construction of new treatment facilities. Given the needs facing rapidly growing local governments, the impact fee and/or connection charge will become commonplace. Over the 1975-1980 period, the growth of user fees outpaced that of all other local government revenue sources, including intergovernmental aid and property taxes. In 1980, user fees constituted 23.8 percent of total local government revenues.

For local governments to pay for needed water treatment facilities, a one-time connection/impact fee of $654 per house would be needed for 1982-1985, $686 per house for 1986-1990, and $911 per house for 1991-2000. These fees are more than 1.5 times higher than the comparable wastewater fees because of the lack of federal funds for water treatment and distribution systems. Table 5.2 provides a summary of water costs, revenues and shortfall for 1982-2000. Depending upon local efforts, the shortfall will range from $0-225.5 million for 1982-1985, $0-294.6 million for 1986-1990, and $0-733.5 million for 1991-2000. The backlog category is also shown on the table; however, no estimates were available.

TABLE 5.2
WATER SYSTEM SUMMARY OF NEEDS AND RESOURCES
(IN MILLIONS OF 1982 $)

	Backlog	1982-1985	1986-1990	1991-2000
Costs	N/A	225.5	294.6	733.5
Revenues*	N/A	0-225.5	0-294.6	0-733.5
Shortfall	N/A	0-225.5	0-294.6	0-733.5

N/A--not available
*Revenues shown are derived by local government via one-time connection charges that amount to $654/house in 1982-1985, $686/house for 1986-1990, and $911/house for 1991-2000.

CHAPTER 6

SUMMARY AND CONCLUSIONS

6.1 Summary

The results of this preliminary analysis are shown in Table 6.1. The cumulative needs for the eighteen-year period from 1982 to 2000 total $30.845 billion; however if identified backlog needs are included, the total increases to $41.012 billion. The resources to provide these needs range from $18.300 billion to $20.268 billion, depending on the amount of local effort. The level of unmet needs over the eighteen-year period ranges from $10.577 billion to $12.545 billion. In other words, 59 percent to 66 percent of the needs can be provided given available resources, and 34 to 41 percent of the needs will be unmet. Furthermore, the capital needs examined here represent only three of a host of capital needs. Not included in this analysis are schools, prisons, public-safety facilities, libraries, public buildings, drainage and solid-waste disposal facilities. If these items had been included, the level of estimated needs would have been at least 50 percent higher based on past capital spending trends.

The two most-costly capital items not addressed here were schools and prisons. With Florida's growth rate, keeping pace with school construction is difficult. Research conducted last year indicated that the statewide school needs for the 1980-1985 period amounted to $3.936 billion, with 88 percent of this need concentrated in urban areas. On average, capital school requirements for each new student total $2,500.

The other costly capital item is prisons. Many times, state and local governments like to forget about providing prison facilities; however, since much of the prison construction is court-ordered, it takes precedence over other capital needs.

Based upon the conclusions thus far it appears that the state is in some difficulty. However, the following factors need to be considered. First, local governments have a substantial degree of unused fiscal capacity. Second, the availability of accurate data on revenue sources is spotty at best. This study was not able to identify firm sources of funding for many of the capital-need categories, particularly water and wastewater. It is known that water and wastewater projects are becoming increasingly dependent on impact fees, connection charges and user charges for capital-construction funding. However, a good estimate of the amount of these funds will not be known unless and until an in-depth local government analysis is undertaken. Third, the needs presented here provide estimates for one level of service. It is possible that the state will not be able to maintain the levels of service that everyone would desire. Fourth, the current administration in Tallahassee is making efforts to provide funds for these infrastructure needs. During this past legislative session alone, an additional penny was added to the state sales tax; changes were made to the state gas tax; counties were given the authority to add up to four additional cents on the state gas tax; and an additional $100 million was provided to help local governments meet their wastewater facility needs. These efforts will help to overcome the impacts of federal cutbacks for transit systems and wastewater treatment facilities. It is unknown how far these efforts will go to providing both past and future capital needs.

With the uncertainty surrounding Proposition One,* it is doubtful that any significant new sources of revenue will be tapped. If the amendment is approved, the recent increases in the state sales tax and the state motor fuel tax will be negated. Thus, while the state has substantial unused fiscal capacity, as noted in the first chapter, there is little chance that it will be utilized in the next several years.

6.2 Validity of the Results

One question that must be raised in conducting an analysis of this type is: "how valid are the results?" It has been acknowledged that many of the need and revenue estimates are suspect, particularly local government needs/resources that are determined through surveys. One method of checking the results is a comparison with current levels of capital spending by state and local governments. Table 1.2 indicates that in 1981, total capital spending was $3.127 billion. For the needs addressed by this report (roads, water and wastewater) the level of spending was $1.389 billion. Table 6.1 indicates an eighteen-year expenditure for highways, water and wastewater of $30.845 billion. In annual terms, this figure results in an annual expenditure of $1.714 billion. The difference between the actual amount spent in 1981 versus the amount forecast in this study is $325.0 million. However, if the

*A citizens' initiative on the November, 1984, ballot that would limit state and local government revenues.

TABLE 6.1
SUMMARY TABLE: OVERALL NEEDS AND RESOURCES
(IN MILLIONS OF 1982 $)

	Backlog	1982-1985	1986-1990	1991-2000	Cumulative** 1982-2000
Transportation					
Needs	8067.4*	5860.5	7365.4	14778.3	28004.2
Resources	N/A	3458.1	4861.2	9107.6	17426.9
Shortfall	8067.4	2402.4	2504.2	5670.7	10577.3
Wastewater					
Needs	2100.0	313.7	396.1	878.0	1587.8
Resources	N/A	172.5-313.7	217.9-396.1	482.9-878.0	873.3-1587.8
Shortfall	2100.0	0-41.2	0-178.2	0-395.1	0-614.5
Water					
Needs	N/A	225.5	294.6	733.5	1253.6
Resources	N/A	0-225.5	0-294.6	0-733.5	0-1253.6
Shortfall	N/A	0-225.5	0-294.6	0-733.5	0-1253.6
Total					
Needs	10167.4	6399.7	8056.1	16389.8	30845.6
Resources	N/A	2769.1-2402.4	2977.0-2504.2	5670.7-6799.3	18300.2-20268.3
Shortfall	10167.4	3630.6-3997.3	5079.1-5551.9	9690.5-10719.1	10577.3-12545.4

N/A--not available
*Backlog needs are only for state/federal roads/bridges
**Does not include backlog
Source: See Tables 3.8, 3.10, 3.11, 4.2, 5.2

backlog needs are included in the eighteen-year estimate, the difference becomes $889.0 million. Thus it appears that the capital needs presented in this report are fairly accurate, given the constraints involved in their determination.

6.3 Recommendations

The most important recommendation that can come from such a study is that this effort be continued. For a state with more than $30 billion in infrastructure needs over the next eighteen years, little study has been done. The assessment of capital needs should be an ongoing effort at both the state and local level. While local governments are required to provide a capital-needs program in their comprehensive plans, the efforts to date have been woefully inadequate. Additionally, some type of statewide panel should be established that would look at alternative means for financing capital needs.

Another recommendation based on the findings of this research would be a requirement that local governments report their capital expenditures on an annual basis. It is almost impossible to determine what local governments have spent for capital improvements without doing an individual case study for each local government. At the present time, the capital and operating expenditures are combined. The rate at which local governments are providing capital facilities is an important variable in determining what they will need to provide in the future.

APPENDICES

OFFICIAL FLORIDA POPULATION PROJECTIONS

(IN MILLIONS)

	Estimate	Projections		
	1981	1985	1990	2000
Florida	10.105			
Low		10.598	11.342	12.688
Medium		11.084	12.304	14.593
High		11.408	12.946	15.863

Source: Projections of Florida Population by County, 1982-2020, Bureau of Economic and Business Research, University of Florida, May, 1982.

SANITARY SEWERS: TOTAL IN-PLACE COSTS

Pipe Diameter (inches)	Average Costs (1982$/ft)
8	47
10	59
12	68
15	85
18	110
21	132
24	149
27	172
30	185
36	224
42	302
48	359
54	419
60	530
66	556
72	695

Source: Construction Costs for Municipal Wastewater Conveyance Systems, U.S.E.P.A., 1979.